

Appl. No. 10/056,880
Amdt. Dated July 1, 2004
Reply to Office Action of April 9, 2004

REMARKS

In the Office Action dated April 9, 2004, an objection was raised against claims 18 and 23; claims 1-24 were rejected under 35 U.S.C. § 103 over U.S. Patent No. 6,138,111 (Krishna) in view of U.S. Patent No. 6,338,056 (Dessloch).

Applicant respectfully submits that the asserted combination of Krishna and Dessloch does not render obvious the claimed invention.

With respect to claim 1, the Office Action asserted that Krishna teaches the receiving of a join query containing a selection predicate and a projection, determining the cost associated with applying the function on a first table and the cost associated with applying the function on a second table, and selecting a join path based on relative costs of applying the function on the first and second tables. Note that the "receiving" clause quoted in the Office Action is only part of the actual clause recited in claim 1. As conceded by the Office Action, Krishna fails to disclose receiving a join query containing at least one function selected from the group of a selection predicate *applied on a complex attribute*, a projection *applied on a complex attribute*, and a *user-defined data type method*. Each of the "determining" and "selecting" clauses of claim 1 also refers to applying the function, which must be at least one of the selection predicate applied on a complex attribute, a projection applied on a complex attribute, and a user-defined data type method. Such a requirement is ignored by the Office Action in the assertions made in the Office Action that the receiving, determining, and selective acts are disclosed by Krishna.

In attempting to fix this deficiency of Krishna, the Office Action cited Dessloch as teaching join queries containing a selection predicate, a projection or a user-defined data type method. However, Dessloch fails to teach the determination of a cost associated with applying a selection predicate on a complex attribute, a projection applied on a complex attribute, or a user-defined data type method on a first table and a cost associated with applying such a function on a second table. Nor does Dessloch provide any teaching of selecting a join path based on relative cost of applying the function (which is at least one of the predicate applied on a complex attribute, the projection applied on a complex attribute, and a user-defined data type method) on the first and second tables.

Rather, Dessloch is concerned with a completely different issue, which is associated with using an external search engine accessible to a database engine. In response to a query, object

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identifiers are retrieved from an index in an external database by the external search engine, with the object identifiers returned by the external search engine used by the database engine to retrieve one or more row identifiers from the index in a relational database. Dessloch, 3:34-45. However, there is no teaching or suggestion whatsoever in Dessloch of determining costs associated with applying a function (that is one of a selection predicate applied on a complex attribute, a projection applied on a complex attribute, and a user-defined data type method) on a first table and on a second table, and selecting a join path based on relative costs of applying such a function on the first and second tables. Although Krishna may teach join order selection for a query that specifies functions applied on simple predicates, there is no suggestion anywhere within Krishna of the determining and selecting acts associated with applying the recited function on first and second tables, as recited in claim 1.

Therefore, the hypothetical combination of Krishna and Dessloch fails to teach or suggest *all* elements of the claimed invention. A *prima facie* obviousness rejection has not been established for at least this basis. See M.P.E.P. § 2143 (8th ed., Rev. 2) at 2100-129.

Moreover, there simply is no motivation or suggestion to combine Krishna and Dessloch in the manner proposed by the Office Action. Krishna deals with calculating an optimal *order* in which to join tables in a multiple join query. Krishna, 3:26-27. In other words, Krishna is concerned with selecting an order of joins of multiple tables to achieve minimum cost. Krishna has nothing to do with selecting a join path based on cost associated with applying a function (that is one of a selection predicate applied on a complex attribute, a projection applied on a complex attribute, and a user-defined data type method) on the first and second tables. Dessloch fails to provide any suggestion or motivation to modify the teachings of Krishna to achieve the claimed invention. Dessloch describes a mechanism that determines whether an external index 114 is to be used or not to enhance database searching. Dessloch thus provides no suggestion of selecting a join path based on relative cost of applying the recited function on first and second tables. Therefore, no motivation or suggestion existed in either of the teachings of Krishna or Dessloch that would suggest a modification of Krishna in the manner proposed by the Office Action. The *prima facie* case of obviousness is defective for this further reason.

With respect to independent claim 11, the asserted combination of Krishna and Dessloch fails to teach or suggest the selecting of a join path in which a function is applied on a join table rather than a first table or a second table to reduce cost that is based at least in part on a cost

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associated with application of a function that is at least one of a selection predicate applied on a complex attribute, a projection applied on a complex attribute, or a user-defined data type method. As described above, Krishna is concerned with changing the order of joins to achieve a minimum cost. On the other hand, Dessloch is concerned with using an external index to enhance database searching. In view of this, the prima facie case of obviousness fails on at least the following grounds: (1) there is no motivation or suggestion to combine Krishna and Dessloch; and (2) even if they can be combined, the hypothetical combination of Krishna and Dessloch fails to teach or suggest all elements of the claim.

Claim 14 has been amended from dependent form to independent form, with the scope of the claim remaining *broadened*. Claim 14 recites that the join query specifies the function being applied on a first table. Despite the fact that the join query specifies the function being applied on a first table, claim 14 recites determining a join path that applies the function on a second table having a lower cardinality than the first table. Changing the join orders of tables as performed in Krishna has nothing to do with applying a function on a different table than a table specified by the join query for application of the function. Therefore, the asserted combination of Krishna and Dessloch fails to teach or suggest the invention of claim 14.

Independent claim 18 is allowable over the asserted combination of Krishna and Dessloch for reasons similar to those of claim 1. Claim 18 has been amended to delete the "adapted" language -- this amendment has broadened the scope of claim 18. Claim 23 has similarly been amended to delete the "adapted" language.

Newly added independent claims 32 is also allowable because Krishna and Dessloch fails to teach or suggest selecting a first or second join path based on whether a selection predicate or projection is applied on a complex or non-complex attribute.

Dependent claims including newly added dependent claims 25-31, are allowable for at least the same reasons as corresponding independent claims.


In view of the amendments and remarks herein, the application is believed to be in condition for allowance. The Examiner's prompt action in accordance therewith is respectfully requested.

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The Commissioner is authorized to charge any additional fees, including extension of time fees, and/or credit any overpayment to Deposit Account No. 50-1673 (9786).

Respectfully submitted,

Date: July 1, 2004


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